may distribute this information to both the IM **4360** running on the UIP **3600**, as well as to tasks on the RTP **3500** itself.

[1077] The RTP Status Task **4230** may also be charged with fluid accounting for the ongoing infusion. Pump starts and stops, as well as pumping progress may be reported to RTP Status **4230** by the Pump Control Task **4256**. The RTP Status Task **4230** may account for at least one of the following: total volume infused, primary volume delivered, primary VTBI (counted down), volume delivered and VTBI of a bolus while the bolus is in progress, and volume delivered and VTBI of a secondary infusion while the secondary infusion is in progress.

[1078] All alerts or alarms originating on the RTP **3500** may be funneled through the RTP Status Task **4230**, and subsequently passed up to the UIP **3600**.

[1079] While the unit is in operation, the program flash, and RAM memory may be continually tested by the Memory Checker Task **4240**. This non-destructive test may be scheduled so that the entire memory space on the RTP **3500** is tested every few hours. Additional periodic checks may be scheduled under this task if needed.

[1080] Tasks running on the RTP **3500** may be required to communicate with each other as well as to tasks that are executing on the UIP **3600**.

[1081] The RTP messaging system may use a unified global addressing scheme to allow messages to be passed to any task in the system. Local messages may be passed in memory utilizing the facilities of the RTOS' message passing, with off-chip messages routed over the (asynchronous serial **3601**) communications link by the InterComm Task **4210**.

[1082] The InterComm Task **4210** may manage the RTP **3500** side of the serial link **3601** between the two processors. It is the RTP **3500** equivalent of the InterComm Process **4310** on the UIP **3600**. Messages received from the UIP **3600** may be relayed to their destination on the RTP **3500**. Outbound messages may be forwarded to InterComm Process **4310** on the UIP **3600**.

[1083] All messages between the RTP **3500** and the UIP **3600** may be checked for data corruption using an error-detecting code (32 bit CRC). Messages sent over the serial link **3601** may be re-sent if corruption is detected. This provides a communications system that may be reasonably tolerant to ESD. Corrupted messages within the processor between processes may be handled as a hard system failure. All of the message payloads used with the messaging system may be data classes derived from a common baseclass (MessageBase) to assure consistency across all possible message destinations.

[1084] Brushless Motor control **4262** may not run as a task; it may be implemented as a strict foreground (interrupt context) process. Interrupts may be generated from the commutator or hall sensors **3436**, and the commutation algorithm may be run entirely in the interrupt service routine.

[1085] FIGS. **335** and **336** illustrate the geometry of two dual-band antennas that may be used with the peristaltic pump **2990** in accordance with en embodiment of the present disclosure. FIG. **335** shows a top and a bottom view of the antenna, which may be fabricated using metallic layers on a substrate, such as is typically made when manufacturing a printed circuit board. FIG. **336** may also be fabricated using a printed circuit board manufacturing method.

[1086] Various alternatives and modifications can be devised by those skilled in the art without departing from the disclosure. Accordingly, the present disclosure is intended to embrace all such alternatives, modifications and variances. Additionally, while several embodiments of the present disclosure have been shown in the drawings and/or discussed herein, it is not intended that the disclosure be limited thereto, as it is intended that the disclosure be as broad in scope as the art will allow and that the specification be read likewise. Therefore, the above description should not be construed as limiting, but merely as exemplifications of particular embodiments. And, those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto. Other elements, steps, methods and techniques that are insubstantially different from those described above and/or in the appended claims are also intended to be within the scope of the disclosure.

[1087] The embodiments shown in the drawings are presented only to demonstrate certain examples of the disclosure. And, the drawings described are only illustrative and are non-limiting. In the drawings, for illustrative purposes, the size of some of the elements may be exaggerated and not drawn to a particular scale. Additionally, elements shown within the drawings that have the same numbers may be identical elements or may be similar elements, depending on the context.

[1088] Where the term "comprising" is used in the present description and claims, it does not exclude other elements or steps. Where an indefinite or definite article is used when referring to a singular noun, e.g., "a," "an," or "the," this includes a plural of that noun unless something otherwise is specifically stated. Hence, the term "comprising" should not be interpreted as being restricted to the items listed thereafter; it does not exclude other elements or steps, and so the scope of the expression "a device comprising items A and B" should not be limited to devices consisting only of components A and B. This expression signifies that, with respect to the present disclosure, the only relevant components of the device are A and B.

[1089] Furthermore, the terms "first," "second," "third," and the like, whether used in the description or in the claims, are provided for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances (unless clearly disclosed otherwise) and that the embodiments of the disclosure described herein are capable of operation in other sequences and/or arrangements than are described or illustrated herein.

What is claimed is:

1. A peristaltic pump for pumping fluid in a plurality of cycles where each cycle has at least a first stage and a second stage, the peristaltic pump comprising:

a biased plunger biased toward a tube;

a first valve upstream of the biased plunger;

a second valve downstream of the biased plunger; and

an actuator configured to engage and disengage from the biased plunger,

wherein:

in the first stage, the first valve is opened and the biased plunger is moved away from the tube by the actuator,

in the second stage, the first valve is closed, the biased plunger is moved toward the tube, and the actuator is disengaged from the biased plunger, and